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Patent
PD-990213

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of: Date: December 23, 2004

Arthur W. Wang

Serial No: 09/536,275 Group Art Unit: 2682

Filed: 03/27/2000 Examiner: Nguyen, David Q.

For: SATELLITE COMMUNICATION SYSTEM

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BRIEF ON APPEAL

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Sir:

The following Appeal Brief is submitted pursuant to the Notice of Appeal filed on October 27, 2004, for the above-identified application.

I. Real Party in Interest

The real party in interest in this matter is The DirecTV Group, Inc of El Segundo, California which is 34 percent owned by Fox Entertainment Group, which is approximately 82 percent owned by The News Corporation, Limited.

II. Related Appeals and Interferences

There are no other known appeals or interferences which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of the Claims

Claims 1-21, 23 and 25-34 stand rejected in the Final Office Action.

IV. Status of Amendments Filed After Final

There have been no Amendments filed after the final rejection.

V. Summary of the Invention

The present application is generally directed to a communication system 40 that is best illustrated in Figure 3. The common feature that is presented throughout the claims is that the satellites generate a plurality of beams with variable beam widths to provide a substantially uniform cell size. The variable beam width is desirable to maintain the cell size because the satellites are in an elliptical sub-geosynchronous orbit and therefore their positions move relative to the Earth. By maintaining the size at the cell size at the ground by changing the beam width, a uniform predicable system is formed.

Claim 1 is directed to a communications system that includes a plurality of regional ground stations and a plurality of satellites 42a, 42b, 44a, 44b located in an elliptical sub-geosynchronous orbit 32 with respect to the earth. The orbit 32 is best

illustrated in Figure 2 which is described on Page 9, line 14-page 10, line 15. The satellites operate in a service area in a synchronized manner to provide continuous coverage to the service area. The satellites 42a, 42b, 44a, 44b generate a plurality of beams with variable beam widths to provide a substantially uniform cell size 48, 52 covering the service area. The system further includes a plurality of user terminals within the service area receiving communication signals from the satellite.

Claim 2 recites that the ground station is coupled to one selected from the group consisting of internet service provider, television center 60, and a corporate internet 62.

Claim 3 recites that the uniform cells are substantially fixed within the service area.

Claim 4 recites that the plurality of beams provide equal capacity density to the cell size.

Claim 5 recites that the sub-geosynchronous orbit has a minimum elevation angle greater than 10 degrees in the service area.

Claim 6 recites that the service area is a primary market.

Claim 7 recites that the satellites comprise a phased array to form the plurality of beams.

Claim 8 recites that the first plurality of satellites are disabled when coextensive with a geostationary orbit. This insures that no interference exists between the two systems.

Claim 9 recites that the plurality of satellites is less than 9.

Claim 10 recites that the plurality of satellites is 4.

Claim 11 recites that the plurality of satellites is 5.

Claim 12 is another independent claim directed to a communications system. Claim 12 specifically recites a first plurality of satellites and a second plurality of satellites. The first plurality of satellites are located in a sub-geosynchronous orbit and have similar limitations with respect to the elliptical sub-geosynchronous orbit and

variable beamwidth to obtain a substantially uniform cell size covering the service area. The first plurality of satellites provide a system capacity. The second plurality of satellites are deployed after the first plurality of satellites and provide a second system capacity greater than the first system capacity.

Claim 13 corresponds to Claim 3, Claim 14 corresponds to Claim 4, Claim 15 corresponds to Claim 5, Claim 16 corresponds to Claim 6, Claim 17 corresponds to Claim 7, Claim 18 corresponds to Claim 8, Claim 19 corresponds to Claim 9, Claim 20 corresponds to Claim 10, and Claim 21 corresponds to Claim 11.

Claim 22 is an independent method claim having similar limitations to Claim 1 with respect to the inclined sub-geosynchronous satellite orbit and bearing the beamwidth so the beam generated during operation in an active arc of an orbit. Claim 22 specifically recites the steps of handing over an operation from a first satellite to a second satellite to maintain at least the minimum elevation angle and operating the satellite to generate the plurality of fixed cells by varying the beamwidth of the beams generated during the operation in an active arc of the orbit.

Claim 23 specifically recites that the orbit is an inclined eccentric sub-geosynchronous orbit.

Claim 24 has been withdrawn.

Claim 25 is also an independent method claim directed to developing a satellite constellation having a first set of satellites located in an elliptical sub-geosynchronous orbit so that the satellites operate in a synchronized manner to provide continuous coverage to the service area. The satellites generate a plurality of beams with variable beamwidth formed as a function of the orbit position to obtain substantially uniform cell size covering the service area. The second set of satellites form a second satellite constellation having primary market coverage in cooperation with the first set of satellites to have a service area greater than the first service area. This is similar to that of Claim 12 but in method form.

Claim 26 recites launching a third set of satellites to form optimized landmass coverage to cooperate with the first set of satellites and the second set of satellites. The third service area is greater than the second service area.

Claim 27 specifically recites first constellation, second constellation and third constellation comprise SGSO satellites.

Claims 28 and 29 recite, respectively, that the first set of satellites and the second set of satellites do not interfere with GSO satellites.

Claim 30 recites that the satellites and the second set of satellites have active arc size to provide continuous coverage to the second service area.

Claim 31 recites that the first and second set of satellites have active arcs to be non-interfering with GSO satellites.

Claim 32 is also an independent claim and recites a plurality of regional ground stations and plurality of satellites located in an elliptical sub-geosynchronous orbit with respect to the earth. The satellites operate in a service area in a synchronized manner to provide continuous coverage to the service area. The satellites generate a plurality of beams with variable beamwidths that vary as a function of orbital position to obtain a substantially uniform cell size covering the service area and plurality of user terminals with the service area receiving communication signals from the satellite.

Claim 33 recites that the plurality of satellites operate using a frequency of the GSO satellite.

Claim 34 recites that the plurality of satellites do not operate in the GSO satellite avoidance zone.

VI. Grounds of Rejection to be Reviewed on Appeal

The following issues are presented in this appeal:

Whether Claims 1, 3, 6, 7, 9-13, 17, 19-21, 23, 25-33 are anticipated under 35 U.S.C. §102(e) over *Castiel* (2002/0160710).

Whether Claims 4-5 and 4-15 are obvious under 35 U.S.C. §103(a) over *Castiel* (2002/0160710) in view of *Taormina* (6,257,526).

Whether Claims 8 and 18 are obvious under 35 U.S.C. §103(a) over *Castiel* (2002/0160710) in view of *Schloemer* (RE37140).

VII. Argument

The Rejection of Claims 1, 3, 6, 7, 9-13, 17, 19-21, 23, 25-33 under 35 U.S.C. §102(e)

Claim 1

As mentioned above, Claim 1 has a plurality of regional ground stations and a plurality of satellites located in an elliptical sub-geosynchronous orbit with respect to the earth. The satellites operate in a service area in a synchronized manner to provide continuous coverage to the service area. The satellites generate a plurality of beams with variable beam widths to provide a substantially uniform cell size covering the service area. The system further includes a plurality of user terminals within the service area receiving communication signals from the satellite.

The *Castiel* reference is directed to a communications system that admittedly includes elliptical sub-geosynchronous orbits that provide coverage to a service area. The Examiner states that the *Castiel* reference includes, "said satellite generating a plurality of beams with variable beam widths to obtain a substantially uniform cell size covering said service area." The Examiner directs the Appellant to Fig. 1, paragraphs 3, 4, 62, and 68. Appellant has reviewed these sections and can find no teaching or suggestion of variable beam widths. In the present application, as in the *Castiel*

reference, the satellites are not stationary in their orbits. Thus, the satellites move relative to the earth. As would be evident to those skilled in the art, the size of a fixed beam from a satellite would vary as the distance from the earth varies. It is desirable in satellite systems to provide certainty for the size of a coverage area. Therefore, the present invention employs variable beam widths to obtain a substantially uniform cell size covering the service area. The portions of the *Castiel* reference pointed to by the Examiner does not teach or suggest varying the beam width size. In fact, the *Castiel* reference teaches the satellites are similar to geosynchronous satellites. This implies that the beams are not changed since fixed beams are used in geostationary applications.

In response to the Appellant's response, the Examiner on page 2 of the Final Office Action states, "In satellite communication, a beam former driving a transmit, steerable phased-array antenna being an antenna with a variable beamwidth is well known in the art (see Anderson et al., US 5117240 col. 1, lines 55-57). Therefore, Castiel reference discloses satellite generating a plurality of beams with variable beam widths." Appellant respectfully submits that the teaching must be found in the reference or implied. However, Appellant believes the implication is for fixed beams like a geosynchronous satellite, not variable beams. Appellant respectfully submits that the Examiner is trying in hindsight to for the invention.

Claim 12

Claim 12 is also believed to be allowable for the same reasons set forth above. Claim 12 also recites the plurality of satellites are located in an elliptical sub-geosynchronous orbit and have variable beamwidths. Claim 12 also includes a further limitation that is not illustrated in the *Castiel* reference in that a second plurality of satellites are provided to generate a system capacity greater than the first capacity.

Claim 22

Claim 22 is also believed to be allowable for the same reasons set forth above with respect to Claim 1 in that the satellites are in inclined sub-geosynchronous orbit and have

variable beamwidths. As mentioned above, these features are not illustrated in the *Castiel* reference. Claim 22 further recites the limitations of handing over an operation from the first satellite to a second satellite and to maintain at least the minimum elevation angle.

Claim 25

Claim 25 sets forth a method of developing a customized satellite constellation that includes similar limitations to that of Claim 1 in that an elliptical sub-geosynchronous orbit is established and that the first plurality of satellites includes variable beamwidths. Claim 25 also teaches launching a second set of satellites to form a second constellation with a second service area greater than the first area. The dependent claims of Claim 25 recite an additional third set of satellites.

Claim 32

Claim 32 is a communications system that has a plurality of regional ground stations, a plurality of satellites located in elliptical sub-geosynchronous orbit with respect to the earth so that the satellites use beamwidths that vary the function of the orbital position to obtain substantially uniform cell size covering the service area. As mentioned above, the combination of satellites in elliptical sub-geosynchronous orbit and varying the beamwidths to maintain the cell size is not taught or suggested in the *Castiel* reference.

Claim 3

Claim 3 recites that the uniform cells are substantially fixed within the service area. This is not taught or suggested in the *Castiel* reference and therefore Appellant respectfully submits that this claim is also independently patentable.

Claim 6

Claim 6 recites that the service area is a primary market. No teaching or suggestion is provided in the *Castiel* reference for a primary market.

Claim 7

Claim 7 recites that the plurality of satellites comprise a phased array antenna to form the plurality of beams. This in combination with the limitations set forth in Claim 1 are not taught or suggested in the *Castiel* reference.

Claims 9-11

Claims 9-11 are independently patentable since they set forth that the plurality of satellites comprises less than 9, 4 satellites and 5 satellites. These limitations in combination with those of independent Claim 1 are not taught or suggested in the references.

Claims 13, 17, 19-21

The claims dependent on Claim 12, namely 13, 17, 19-21 are allowable for the same reasons set forth above with respect to the dependent claims of Claim 1 since they correspond directly thereto.

Claim 23

Claim 23 is allowable since the satellite orbits are inclined eccentric sub-geosynchronous orbits. This in combination with the recitations of Claim 22 are not taught or suggested in the *Castiel* reference.

Claim 26

Claim 26 specifically recites a third set of satellites are deployed that for a third service area greater than the second service area. Appellant respectfully submits that this is not taught or suggested in the *Castiel* reference.

Claim 27

Claim 27 recites that the three constellations comprise SGO satellites. This is not taught or suggested in combination with the recitations of Claim 25.

Claims 28 and 29

Claims 28 and 29 recite that the first set of satellites and second set of satellites, respectively, do not interfere with GSO satellites. No teaching or suggestion is provided

for non-interfering satellites in the *Castiel* reference, particularly in combination with the recitations of independent Claim 25.

Claim 30

Claim 30 recites that the satellites have active arc sized to provide continuous coverage to a second service area. The recitations of Claim 30 in combination with those of Claim 27 are not taught or suggested in the *Castiel* reference.

Claim 31

Claim 31 recites that the first plurality of satellites and the second set of satellites have active arc sized to be non-interfering with GSO satellites. This claim is a combination of Claims 28 and 29. As mentioned above, the limitations of this claim are not taught or suggested in the *Castiel* reference. Therefore, Claim 30 is independently patentable.

Claim 33

Claim 33 is dependent from Claim 32 and recites that the plurality of satellites operate using a frequency of a GSO satellite. This is not taught or suggested in the *Castiel* reference and therefore the limitations of Claim 33 in combination with Claim 32 are not taught or suggested in the *Castiel* reference.

Claim 34

Claim 34 recites that the satellites do not operate in a GSO satellite avoidance zone. Claim 34 depends upon Claim 33 which depends upon Claim 32. As mentioned above, no teaching or suggestion is provided for a GSO satellite avoidance zone. Therefore, Appellant respectfully requests the Board to reverse the Examiner's position with respect to Claim 34.

The Rejection of Claims 4-5 and 14-15 Under 35 U.S.C. §103(1) as being unpatentable over *Castiel* in view of *Taormina* (6,257,526).

Claims 4-5 and 14-15

Because the *Taormina* reference does not describe variable beamwidths, the Appellant respectfully requests the Board to reverse the Examiner's position with respect to Claims 4 and 5 and 14-15. Claim 4 specifically recites providing equal capacity to the plurality of beams.

The *Taormina* reference describes a first deployment of a plurality of satellites in a medium earth orbit and later deployments of pluralities of satellites in the medium earth orbit. If demand on the satellite constellation is increased further, more medium earth satellites may be deployed. However, if spacing between the MEO satellites becomes too small, the satellites may be deployed in an inclined orbit 38. (See for example Abstract and col. 5, lines 24-40.) Although sub-geosynchronous orbits are described, the *Taormina* reference neither teaches nor suggests, for example, "a plurality of satellites located in an **elliptical** sub-geosynchronous orbit with respect to the earth, **said satellites operating in a service area in a synchronized manner to provide continuous coverage to said service area.**" The Appellant agrees with the Examiner in his assessment in the last office action that variable beam widths to obtain a substantially uniform cell size is not shown in *Taormina*.

Claims 8 and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Castiel* in view of *Schloemer* (RE37140).

Claims 8 and 18

Claims 8 and 18 recite disabling a satellite when it is coextensive with a geostationary orbit. Although the Examiner alleges that, "Schloemer discloses the satellites are disabled when coextensive with a geostationary orbit (see col.2, lines 45-

50)", the *Schloemer* reference merely discusses satellites that accidentally end up in an improper orbit and ground control systems to insure that all satellite stay in correct orbits "and to disable a satellite when it is not in the proper grid orbit". This neither teaches nor suggests disabling a satellite when coextensive with a geostationary orbit, as would happen for example in a defined GSO Crossing Zone. Furthermore, it is respectfully submitted that Claims 8 and 18 are allowable over these references since the *Schloemer* reference does not cure the deficiencies of the teachings of the Castiel as discussed earlier in connection with Claims 1 and 12 and therefore Claims 8 and 18 are allowable generally for the same reasons discussed in connection with Claims 1 and 12 and further due to the additional limitations recited therein.

VIII. Appendix

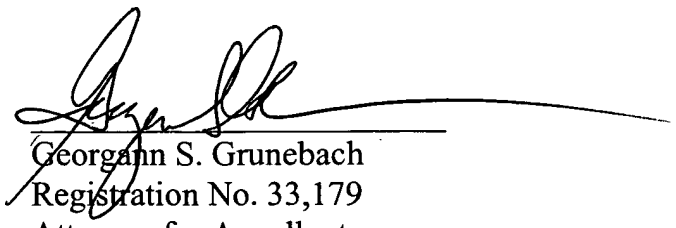
A copy of each of the claims involved in this appeal, namely Claims 1-21, 23, and 25-34 are attached as Appendix A.

IX. Conclusion

For the foregoing reasons, Appellants respectfully request that the Board direct the Examiner in charge of this examination to withdraw the rejections.

Please charge any fees required in the filing of this appeal to **deposit account 50-0383.**

Respectfully submitted,



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Date: December 23, 2004

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APPENDIX A

1. A communications system comprising:

a plurality of regional ground stations;

a plurality of satellites located in a elliptical sub-geosynchronous orbit with respect to the earth, said satellites operating in a service area in a synchronized manner to provide continuous coverage to said service area, said satellites generating a plurality of beams with variable beam widths to obtain a substantially uniform cell size covering said service area; and

a plurality of user terminals with the service area receiving communication signals from the satellite.

2. A system as recited in claim 1 wherein said ground station is coupled to one selected from the group consisting of an internet service provider, a broadcast television center and a corporate internet.

3. A communications system as recited in claim 1 wherein said uniform cells are substantially fixed within said service area.

4. A communications system as recited in claim 1 wherein said plurality of beams provide equal capacity density to said cell size.

5. A communications system as recited in claim 1 wherein said sub-geosynchronous orbit has a minimum elevation angle is greater than 10 degrees in said service area.

6. A communications system as recited in claim 1 wherein within said service area is a primary market area.

7. A communications system as recited in claim 1 wherein said plurality of satellites comprise a phased array to form said plurality of beams.

8. A communications system as recited in claim 1 wherein said first plurality of satellites are disabled when coextensive with a geostationary orbit.

9. A communications system as recited in claim 1 wherein said plurality comprises less than 9 satellites.

10. A communications system as recited in claim 1 wherein said plurality comprises 4 satellites.

11. A communications system as recited in claim 1 wherein said plurality comprises 5 satellites.

12. A communications system comprising:

a first plurality of satellites located in an elliptical sub-geosynchronous orbit with respect to the earth, said satellites operating in a service area in a synchronized manner to provide continuous coverage to said service area, said satellites generating a plurality of beams with variable beamwidth to obtain a substantially uniform cell size covering said service area, said first plurality of satellites providing a first system capacity; and

a second plurality of satellites deployed after said first plurality of satellites, said second plurality of satellites providing a second system capacity greater than the first system capacity.

13. A communications system as recited in claim 12 wherein said uniform cells are substantially fixed within said service area.

14. A communications system as recited in claim 12 wherein said plurality of beams provide equal capacity density to said cell size.

15. A communications system as recited in claim 12 wherein said minimum elevation angle is greater than 10 degrees in said service area.

16. A communications system as recited in claim 12 wherein within said service area is a primary market area having an elevation greater than 30°.

17. A communications system as recited in claim 12 wherein said first plurality of satellites comprise a phase array to form said plurality of beams.

18. A communications system as recited in claim 12 wherein said satellites are disabled when coextensive with a geostationary orbit.

19. A communications system as recited in claim 12 wherein said first plurality comprises less than 9 satellites.

20. A communications system as recited in claim 12 wherein said first plurality comprises 4 satellites.

21. A communications system as recited in claim 12 wherein said first plurality comprises 5 satellites.

23. A communications system as recited in claim 12 wherein said orbit is an inclined eccentric sub-geosynchronous orbit.

25. A method of developing a customized satellite constellation comprising the steps of:

developing a first satellite constellation having a first set of satellites having regional coverage having a first service area, said first constellation comprises a first plurality of satellites located in a elliptical sub-geosynchronous orbit with respect to the earth, said satellites operating in a service area in a synchronized manner to provide continuous coverage to said service area, said satellites generating a plurality of beams with variable beam widths formed as a function of orbit position to obtain a substantially uniform cell size covering said service area;

launching a second set of satellites to form a second satellite constellation having primary market coverage in cooperation with said first set of satellites to have a second service area greater than said first service area.

26. A method as recited in claim 25 comprising launching a third set of satellites to form a third satellite constellation having optimized landmass coverage in

cooperation with said first set of satellites and said second set of satellites having a third service area greater than said second service area.

27. A method as recited in claim 27 wherein said first constellation, said second constellation and said third constellation comprise SGSO satellites.

28. A method as recited in claim 26 wherein said first set of satellites are non-interfering with GSO satellites.

29. A method as recited in claim 26 wherein said second set of satellites are non-interfering with GSO satellites.

30. A method as recited in claim 27 wherein said first plurality of satellites and said second set of satellites have active arcs sized to provide continuous coverage to said second service area.

31. A method as recited in claim 27 wherein said first plurality of satellites and said second set of satellites have active arcs sized to be non-interfering with GSO satellites.

32. A communications system comprising:

a plurality of regional ground stations;

a plurality of satellites located in a elliptical sub-geosynchronous orbit with respect to the earth, said satellites operating in a service area in a synchronized manner to provide continuous coverage to said service area, said satellites generating a plurality of beams with variable beam widths that vary as a function of orbital position to obtain a substantially uniform cell size covering said service area; and

a plurality of user terminals with the service area receiving communication signals from the satellite.

33. A communications system as recited in claim 32 wherein said plurality of satellites operate using a frequency of a GSO satellite.

34. A communications system as recited in claim 33 wherein said plurality of satellites not operating in a GSO satellite avoidance zone.